

**AP<sup>®</sup> BIOLOGY**  
**2003 SCORING GUIDELINES (Form B)**

**Question 1**

A difference between prokaryotes and eukaryotes is seen in the organization of their genetic material.

(a) **Discuss** the organization of the genetic material in prokaryotes and eukaryotes.

(b) **Contrast** the following activities in prokaryotes and eukaryotes

- Replication of DNA
- Transcription or translation
- Gene regulation
- Cell division

**(a) 4 points maximum**

(1 point for each bullet; each contrast pair must include 1 bullet from prokaryote and 1 bullet from eukaryote)

Prokaryote	Eukaryote
• No introns	• Introns
• Location: not in nucleus	• Location: nucleus (and Mito&Chloro)
• Circular	• Linear
• No histones	• Histones
• One chromosome, usually	• >one chromosome, usually
• Plasmids common	• Plasmids rare (yeast)
• Supercoiled DNA	• Chromatin DNA

**(b) 8 points maximum**

(each activity has a maximum of 2 points; each contrast pair must include 1 bullet from prokaryote and 1 bullet from eukaryote)

Activity	Prokaryote	Eukaryote
DNA Replication	Single origin	Multiple origin
	No telomeres	Telomeres
	Location: Cyto/Cell Memb	Location: Nucleus (and Mito & Chloro)
Transcription  <u>or</u>	No RNA Processing	RNA processing
	Location: Cyto	Location: Nucleus (and Mito & Chloro)
	Monocistronic	Polycistronic
	Initiation: sigma	Initiation: initiation factors
	1 RNA polymerase	3 RNA polymerase
Translation	T+T coupled	T+T not coupled
	30s/40s	40s/60s
	Location: cyto	Location: also in Mito & Chloro
Gene Regulation	Operon	No operon
	+&- control	+control, primarily
	Enhancers rare	Enhancers common
	none	Methylation, acetylation, Barr bodies
Cell Division	No mitosis/Meiosis	Mitosis/Meiosis
	Rapid	Slower
	No spindles	Spindles